(12) UK Patent Application (19) GB (11) 2 234 965 (13) A

(43) Date of A publication 20.02.1991

(21) Application No 8918091.3

(22) Date of filing 08.08.1989

(51) INT CL[5]
B65D 35/50 47/04

(52) UK CL (Edition K)
B8T TWG T13A
U1S S1064 S1379 S1794

(56) Documents cited
GB 2155448 A GB 2059401 A GB 2020255 A
GB 1175249 A GB 0478065 A EP 0253495 A2
US 4574967 A US 4461408 A

(58) Field of search
UK CL (Edition J) B8T TDAX TWG
INT CL[4] B65D

(71) Applicant
Kenneth Simon Aylett Moore
24 Brackenbury Road, London, W6 0BA,
United Kingdom

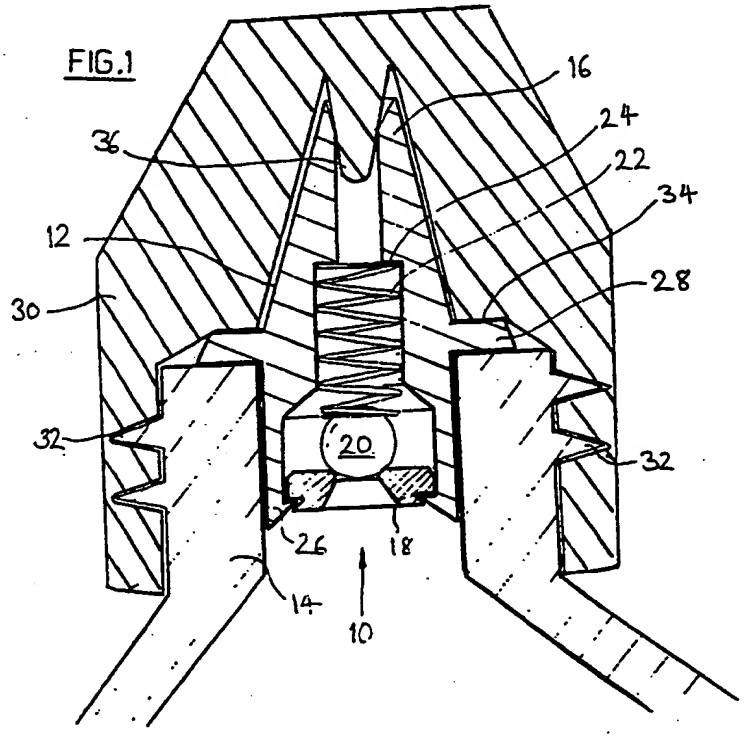
(72) Inventor
Kenneth Simon Aylett Moore

(74) Agent and/or Address for Service
Reddie & Grose
16 Theobalds Road, London WC1X 8PL,
United Kingdom

(54) Container closure

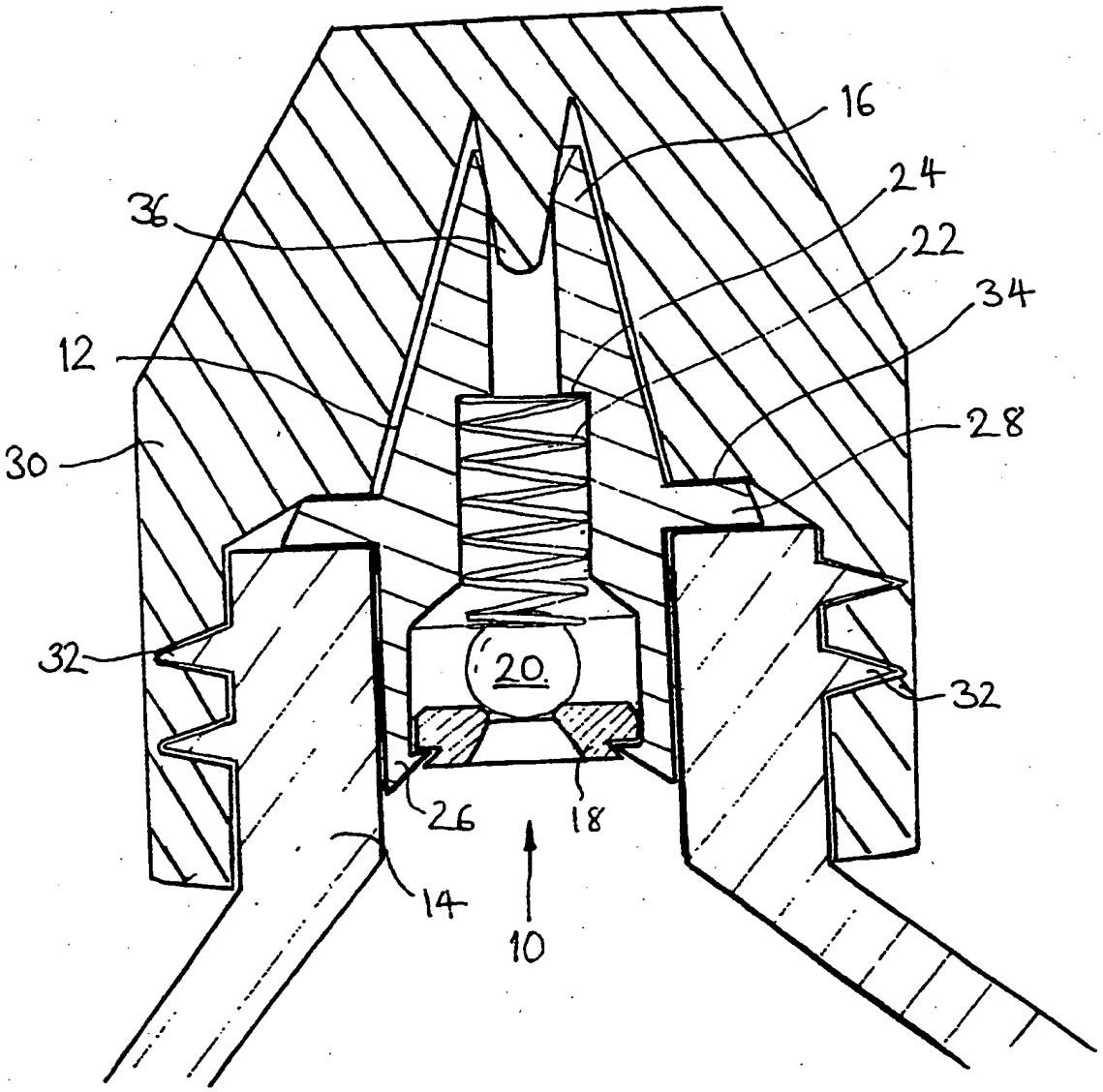
(57) A container closure for use with a flexible container, preferably for sterile fluids, comprises a closure body (12) having therethrough a passage within which is a valve assembly which allows fluid to pass in only one direction, and only when the fluid pressure exceeds a predetermined level. In a preferred embodiment the valve assembly has a spring loaded ball (20) which normally seals a valve port in an annular body (18). In response to increased fluid pressure, as a result of the container being compressed, the ball (20) moves away from the valve port allowing fluid to escape from the container. As soon as compression ceases, the ball (20) moves to close the valve port thereby preventing air contamination of the contents of the container. The spring (22) and/or the annular body may be formed as a unitary plastics moulding with the body (12).

FIG.1



GB 2 234 965 A

FIG.1



CONTAINER CLOSURE

The present invention relates to container closures and in particular to such closures for use with containers for sterile fluids.

Maintaining the sterility of pharmaceutical products, such as saline solution for use with contact lenses, is a recognised problem. Although such products are packaged under sterile conditions, it will be appreciated that, as soon as the package is opened, the product becomes open to the air and hence its 'shelf-life' is greatly reduced.

There are two principal methods by which this problem has been overcome, the first of which is to include preservatives in the product. The main drawback with this method is that many people are allergic to the preservatives. An alternative approach, and one which overcomes the problems of air contamination and preservatives, is to package the product in an aerosol. This however greatly increases the cost both to the manufacturer and customer.

In accordance with the present invention there is provided a container closure comprising a closure body with a passage therethrough, in which passage there is a valve assembly configured to allow fluid to pass in one direction and only when the fluid pressure exceeds a predetermined level, the valve assembly being arranged so that, when the closure is positioned in the opening of a container of flexible material fluid is prevented from entering the container, fluid being permitted to leave only when the fluid pressure within the container exceeds the pressure level set by the valve assembly.

Also in accordance with the present invention there is provided a receptacle for storage and dispensation of fluids comprising a container of flexible material having an opening therein, in which opening is located a closure as defined above.

The container may be of flexible plastics material, such as polypropylene, so that the container may be squeezed to raise the fluid pressure therein which in turn causes the valve assembly to open and allow the fluid out. As soon as pressure on the container ceases, the valve shuts preventing leakage of fluid from the container and preventing air from contacting the remaining fluid within the container.

The use of such a closure therefore overcomes the problems of air contamination without the need for preservatives and without the manufacturer needing to use costly aerosol containers.

One particular preferred embodiment of the present invention will now be described by way of example and with reference to accompanying figure 1 which shows a sectional view of a closure according to the present invention.

The closure 10 comprises a tubular closure body 12 which is inserted in the neck 14 of a soft plastics bottle, the outside diameter of the tubular body 12 being an interference fit in the bottle neck 14. The tubular body 12 is extended outwardly from the bottle to form a spout 16.

Within the passage defined by the tubular body 12 is a valve assembly comprising an annular body 18 of plastics material which defines a valve port, a stainless steel ball 20 forming a valve body, and a helical spring 22 which urges the ball 20

against the annular body 18 to block the valve port. The end of the spring 22 distant from the ball 20 abuts a shoulder 24 formed by a reduction in the bore of the passage. The annular body 18 is held in position by engagement with spring lugs 26 around the lower end of the tubular body 12. In an alternative embodiment (not shown) the spring 22 and/or the annular body 18 is of plastics material and formed as a unitary moulding with the tubular body 12.

A radial flange 28 extends from the outer surface of the tubular body 12 and prevents the closure 10 from passing through the bottle neck 14 and into the bottle. In order to provide a hermetic seal to the bottle, the flange 28 may be ultrasonically welded or melted to the top of the bottle neck 14.

A screw cap 30 is provided which, in position, covers the spout 16 and engages a screw thread 32 on the neck 14 of the bottle. A shoulder 34 inside the cap 30 presses down on the radial flange 28 to hold the closure 10 securely in place when the cap 30 is fitted. The inside of the cap also has a projection 36 which, when the cap 30 is in position (as shown), enters and plugs the spout 16.

In use, the bottle is filled with fluid such as sterile saline solution. To dispense the fluid, the bottle is squeezed: the increased fluid pressure causes the ball 20 to move away from the annular body 18 thus opening the valve port and allowing the fluid to bypass the ball 20 and escape through the spout 16. As soon as the squeezing of the bottle stops and the fluid pressure drops, the ball 20 moves under the influence of the spring 22 to again close the valve port, thereby preventing air contamination of the fluid remaining in the bottle. The reduced fluid pressure within the bottle, caused

by the bottle attempting to return to its natural shape, provides a partial vacuum which increases the closure pressure of the ball 20 against the annular body 18 and improves the seal.

CLAIMS

1. A container closure comprising a closure body with a passage therethrough, in which passage there is a valve assembly configured to allow fluid to pass in one direction and only when the fluid pressure exceeds a predetermined level, the valve assembly being arranged so that, when the closure is positioned in the opening of a container of flexible material fluid is prevented from entering the container, fluid being permitted to leave only when the fluid pressure within the container exceeds the pressure level set by the valve assembly.

2. A closure according to claim 1, in which the valve assembly comprises an annular body defining a valve port, a valve body and a spring which urges the valve body against the annular body to close the port.

3. A closure according to claim 2, in which the annular body is of plastics material and the valve body is a stainless steel ball.

4. A closure according to claim 2 or claim 3, in which the closure body and annular body are a unitary moulding of plastics material.

5. A closure according to claim 2,3 or 4, in which the closure body and spring are a unitary moulding of plastics material.

6. A receptacle for storage and dispensation of fluids comprising a container of flexible material having an opening therein, in which opening is located a closure according to any of claims 1 to 5.

7. A receptacle according to claim 6, in which the container is of flexible plastics material and fluid is dispensed therefrom by squeezing the container.

8. A receptacle according to claim 6 or claim 7, in which a portion of the outer surface of the container about the opening is threaded; the receptacle having a screw cap which, in position, covers the closure in the opening and is held in position by engagement with the threaded portion of the container surface.

9. A receptacle according to claim 8 in which the inner surface of the cap has a projection therefrom, the projection entering and blocking the passage in the closure when the cap is in position.

10. A receptacle according to claim 8 or claim 9, in which the closure body has a radial flange extending therefrom, the flange being held against the surface of the container by the inner surface of the cap when the cap is in position.

11. A receptacle according to claim 10, in which the radial flange is welded to the surface of the container.

12. A container closure substantially as hereinbefore described with reference to the accompanying drawing.

13. A receptacle for storage and dispensation of fluids substantially as hereinbefore described with reference to the accompanying drawings.

Published 1981 at The Patent Office, State House, 66/71 High Holborn, London WC1R 4TP. Further copies may be obtained from ... Multiplex techniques ltd, St Mary Cray, Kent.